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KIRCHHOFF

A Railroad Station

Architecture

B. S.

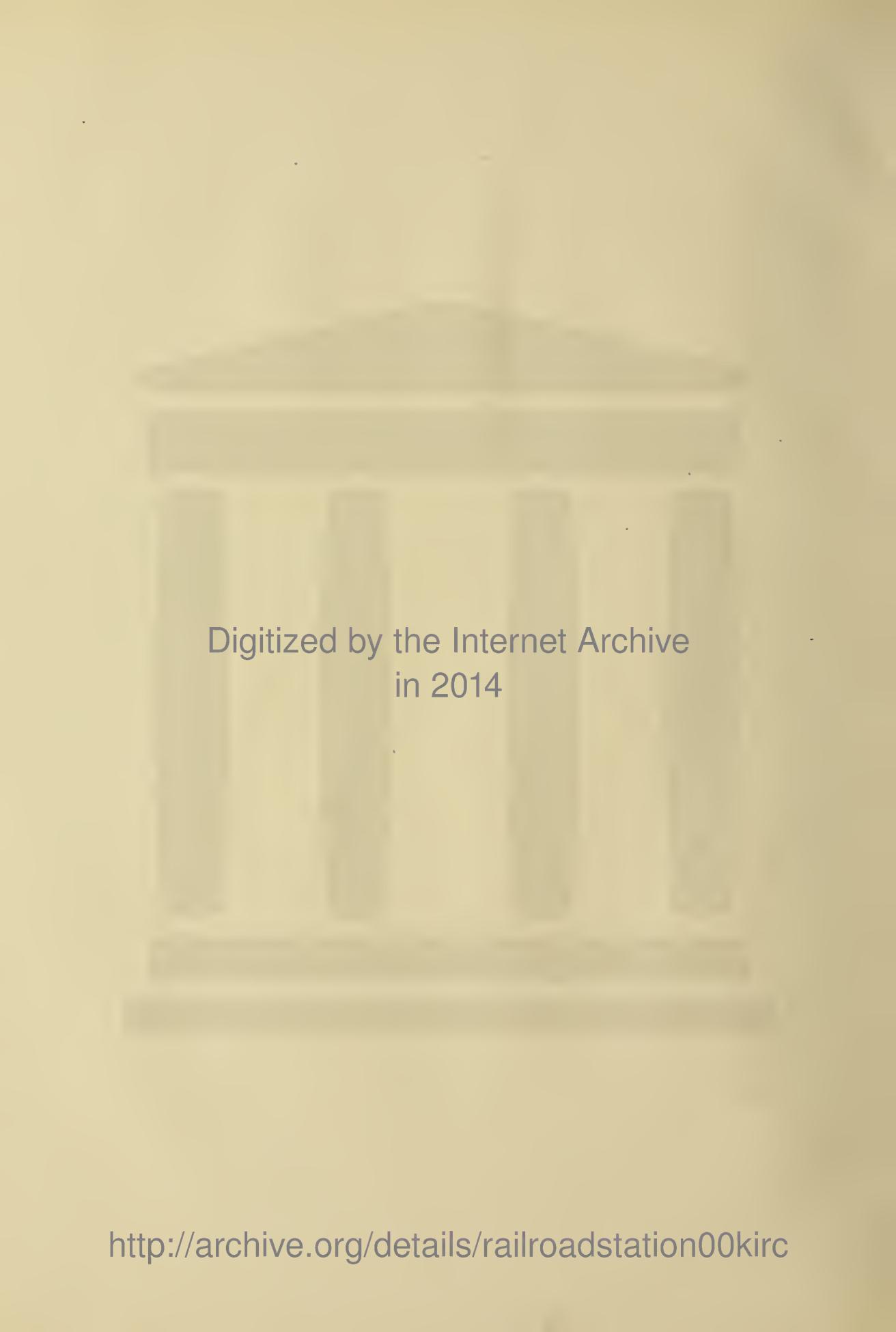
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A very faint, blurry background image of a classical building with four prominent columns and a triangular pediment. The building is rendered in a light beige or cream color, blending with the overall background.

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**A RAILROAD STATION**

**BY**

**ROGER C. KIRCHHOFF**

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**THESIS**

**FOR**

**DEGREE OF BACHELOR OF SCIENCE**

**IN**

**ARCHITECTURE**

---

**COLLEGE OF ENGINEERING**

**UNIVERSITY OF ILLINOIS**

**1913**



1913  
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UNIVERSITY OF ILLINOIS

June 6, 1913

THIS IS TO CERTIFY THAT THE THESIS PREPARED UNDER MY SUPERVISION BY

Roger C. Kirchhoff

ENTITLED A Railroad Station

IS APPROVED BY ME AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE

DEGREE OF Bachelor of Science in Architecture.

Frederick H. Waage

Instructor in Charge

APPROVED: Frederick H. Waage

HEAD OF DEPARTMENT OF

Architecture

247404



## TABLE OF CONTENTS

	Page Number
I. Preface	
II. Program	1
III. Discussion of Solution of Problem	4
IV. Historical Development and Discussion of Scheme	11
V. Description of Final Scheme	16
VI. Construction and Materials	20
VII. Bibliography	22



## PREFACE.

I have chosen a railway station as a subject for a thesis problem because it seems to me to have had the most remarkable present-day development of any of our public or semi-public buildings, and there will undoubtedly be similar progress for many years to come. It may be said about a great many of present modern buildings that they have become apparently standardized in many respects, but this is not so true in the case of a railway station, and each problem is new and has its own unique solution.

I have chosen this particular station at Milwaukee, first; because it is an actual and definite problem with a fixed set of conditions, and fixed piece of property, and, second; because I understand better the present traffic conditions and future needs of this city than of some imaginary city or one which I do not thoroughly understand.



## PROGRAM

### Central Station for Milwaukee, Wisconsin

It is proposed to replace the present Chicago, Milwaukee and St. Paul depot at Milwaukee by a new and modern structure that will be adequate for the city when its population has increased to about 600,000 people. The site will be the present site, extending from Second Street to Fifth Street and from Clyborn Street to Fowler Street. The tracks are to be elevated by that time which will become a new feature of the problem, allowing Third and Fourth Streets to be opened and relieve the heavy traffic now on Second Street. The building is to be of the "through terminal" type to accommodate the heavy through traffic from Chicago to Minneapolis, St. Paul and the Pacific coast. The building must also be a stub for the state traffic, as Milwaukee is a distributing point. In addition to this the building is to take care of the growing suburban traffic at morning and evening, and transport these people to and from their trains in the quickest manner and without their mingling with other through train passengers.

The following accommodations are to be provided for:  
Main Floor.

Train Concourse.

General Waiting Room.



Gentlemen's Waiting Room (including toilets,  
barber shop, etc.)

Ladies' Waiting Room (including Toilet and Re-  
tiring Room)

Baggage Checking Room.

Restaurant (including lunch counter and service  
kitchen.)

Ticket Offices (Pulman offices; Information Bureau)

Suburban Accommodations (Ticket offices, Waiting  
Room, Toilets, etc.)

News Stand, Telegraph Office, Telephone Booths.

Elevators, Stairways (to offices above) Cigar and  
Fruit Stand.

Postal Station (U. S. Mail Rooms)

Baggage Rooms (incoming and outgoing) Storage Rooms

Express Company Offices, - Storage Rooms

Station Master's Office.

Cab Stands, Transfer Bus accommodations, etc.

Second Floor.

Main Dining Hall (with proper service rooms.)

Retiring Room (for people who have to remain through  
long periods for trains.)

Medical Department (including physicians' and nurses'  
quarters and room for patients.)

Bath Rooms and Dressing Rooms.

General Officials' Offices.

Train Dispatchers' quarters (preferably at rear of



building overlooking tracks.)

Interlocking signal station.

Engineering corps' offices, conductors' offices, etc.

Third Floor.

General Offices for clerical force of Railway  
company.

Drawings Required:

Plan (showing second floor with general track lay-  
out and street circulation) at  $1/32"$  equals 1'.

Plan of Main Floor at  $1/16"$  equals 1'.

Main Elevation at  $1/16"$  equals 1'.

Transverse Section at  $1/16"$  equals 1'.



## SOLUTION OF THE PROBLEM.

Not until a city becomes large and develops a heavy street traffic, does it realize the dangers and inconveniences of railroads coming into the city at the street level. In the larger cities like New York and Chicago the railroad companies have spent fabulous sums of money in depressing and elevating their tracks, to say nothing of the millions that have been spent in the railroad tunnels under the Hudson River. So, in the case of Milwaukee, the cry for the past five or ten years has been to elevate the tracks and avoid the constant unnecessary delays at the innumerable crossings as well as the ever-increasing dangers. At present the plans of the Chicago, Milwaukee and St. Paul road are to elevate the tracks into the city. Depression of the tracks would be impossible because of crossing two rivers on coming into the city. Tunneling into the city, of course, would be ideal, but the company could not warrant such a tremendous expense. And since they have made their own decision with respect to elevation of tracks, this immediately settles that one feature of the station design.

The next consideration is with regards to the type of station to be used. With respect to the method of approach of tracks there seem to be three general types, (1) the "stub-terminal", (2) the "through station" and (3) the combination "stub" and "through" station.



Taking these up in order, a "stub-terminal" is naturally used at the end or terminal point of a division of the railroad, as is the case of most of the roads out of Chicago. The trains in such terminals usually end or start their runs from these points and stand on the tracks in the station longer, which explains the great number of tracks and the characteristic track arrangement in such stations. The main tracks begin dividing just outside the station and run up into the station to the bumper end in pairs with the platform between every two sets of tracks. This requires a greater number of tracks than the ordinary through station, as a train is on the tracks usually at least fifteen minutes before starting a run and about the same period of time after completing a run. This track will be dead a longer time if a train has to back out after coming in than if it could proceed straight ahead on the track and be followed in by the second train.

Very many of the trains into Milwaukee are through trains to the Pacific coast averaging from sixteen to eighteen coaches. In case of a stub terminal the engine arriving at the city would draw the coaches into the station and up to the dead or bumper end. The parlor car passenger would then be more than a block from the main building and would have to walk the entire length of the train to get to the main waiting room. To add to this he would encounter baggage and mail trucks unloading from the mail and baggage cars and, last of all, pass the steaming and puffing locomotive which all



naturally adds to the disagreeableness of the long walk.

In the case of the same long train entering a through station, the locomotive could pull the train up far enough so that its own noise and smoke would not be in the center of the building. Also the main and baggage cars would be out of the passengers' way and opposite the mail and baggage rooms, while the whole line of coaches would be equally distant and reasonably near the main building.

From this it is to be decided that the stub terminal has its special function and should not be used unless the conditions are such as actually demand its use. In considering the points in favor of a certain type of station, the public convenience becomes the greatest factor and so, in the case of the example just cited, it shows that the through station type would be the more desirable.

The usual through station has trains coming in at the street level and has its many disadvantages and faults. In the case two long trains arrive at the same time, the one nearer the main building will have to be pulled apart at the center to permit the passengers to leave the track space. In addition the inconvenience of breaking up the trains there are the constant dangers accompanying the crossing of tracks, especially in a large station where, during the rush period of the day, trains are continually leaving and arriving. These particular matters are the great faults of the present station, and some provision must be made in designing the new station to overcome these faults. Since the decision of



the company to elevate the tracks all of these disadvantages can be made to disappear. The track level is about sixteen feet above the floor level of the station. The train can run into the station as usual and discharge the passengers on a platform the entire length of the building and by means of stairways they can reach the concourse below, crossing no tracks, but walking to the main building under the tracks.

In many of the through stations where the trains come in at the street level, the objection to crossing tracks has been overcome by having passengers descend to a tunnel-like passageway under the tracks and then come up to the track level directly adjacent to their train by means of stairways, serving every two sets of tracks. This means the passenger, about to leave the train, must go down a flight of steps and then back up again. With the present solution for the Milwaukee station the traveler will need to go but one flight of steps.

To return again to the decision of the type of station, the through station has still another big point in its favor with regard to saving time on its train operations. It is evident that in the stub type the train must back out, stop, and start out again in the new direction, while in a through station it must start but once, saving all this time to say nothing of the expense of installation and up-keep of a complicated system of switching such as would be necessary. Mr. Hunt, in his arguments against a stub terminal for the new Union Station about to be built, says that the through



station increases the capacity of a terminal two and one-half times.

A further study of the traffic conditions of this particular city will show that there are other very important conditions to be considered. The one which I have already discussed is that this building is to be an intermediate point on the coast extension and northern division of the Chicago, Milwaukee and St. Paul Railroad. In addition to this, Milwaukee is the distributing point for trains out into the state and also the center of a rapidly growing suburban traffic. This latter consideration is such as requires a stub terminal with the advantage that suburban trains are usually very short. These varied conditions show that the proposed station must incorporate the schemes of both types of railway stations or a combination of stub and through station .

Another point rises in connection with this suburban traffic. It has been found almost necessary in the large cities to keep this division as separate and distinct as possible from the regular service as it simplifies matters both for passengers and for the railway company.

These points then settle the general conditions of the problem and it just remains to work in some of the minor details and in particular the arrival and departure of passengers and baggage. A person need not have traveled much to be able to close his eyes and picture the usual congestion and disorder at the entrance of the typical railway



station of several years ago, and even of many of the older present stations, where all of the business transactions are carried on at one entrance. Here passengers leave and arrive through the same set of doors, carriages and taxicabs drive up and unload passengers and baggage at the same place, officials of the transfer-bus companies are getting people in the proper vehicle while hotel runners and newsboys try to occupy what little space is left. The Union Station at Washington, D. C. is a striking example of what has been done to avoid each of these disagreeable features. In this station the circulation of passengers and the distribution of traffic was given exceedingly careful attention, so that no matter how many trains are discharging passengers or how large a crowd is about to enter or leave on the same train, there never seems to be any congestion at any particular place. This is due not so much to the spacious accommodations provided as to the proper distribution of traffic and excellent circulation. The passengers leaving trains have a quick way of getting to the street or baggage room and in no way cross the path of those passengers about to board a train. And so with the passengers arriving at the station, those in cabs are driven to a carriage vestibule where they enter the building and the foot passengers enter by the regular main entrance which, however, is not blocked by cabs and vehicles of all sorts, as they have their own stands for that purpose.



And so in the case of the Milwaukee Station, I have endeavored to make a similar separation of traffic and have a definite and properly selected place for every accessory to the railway station. The main entrance should not be habitually crowded and blocked by numerous cabs and taxis, but should present an unobstructed appearance which would give the oncoming traveler the impression that this building is a huge gateway to the city and expresses a welcome, which it surely does not do in so many cases, a good example being the congestion at the entrance to the Union Station in Chicago.



## HISTORICAL AND GENERAL DISCUSSION.

In studying the development of our modern types of buildings, a great many can be traced back to a very early date for their origin. Our theaters had their beginning in the ancient Greek and Roman theaters, and also our present day stadiums are based on the outlines of the Roman circus and amphitheater. The latest civic developments of today in the form of community centers with their various baths and swimming pools, with their reading and lecture rooms and their out-door recreation grounds, are modern adaptions of the Roman thermae, and it is safe to say in the future will become more and more like them.

But in a strict sense the railway station has no such early origin and one must be content that this type of building developed long after the introduction of the steam locomotive. Naturally the earliest form of station had nothing about it in the way of an expression of its uses but was simply any suitable building having sufficient waiting room accommodations as well as a ticket office. Later as the needs and business of the railway companies increased and their operations became more and more complicated they built larger structures, taking into consideration the convenience and comfort of the passengers, until it seems that at the present age we have reached some sort of a climax in the building of great railway stations. It may be said that there has been no development of this type of building nor



of any one type of building like that of railway stations during the present age. Just as the typical Roman buildings during the early centuries were the result of hundreds of years of development, so I think that we are today approaching such a period of completeness, grandeur and extensiveness with regard to railway stations. Every year finds the railway companies building grand monumental structures that compare favorably in every respect with our finest and highest types of public buildings. Every possible convenience and consideration of the traveling public is conscientiously and carefully studied and worked out, with seemingly no thought of expense. Not only are the purely commercial conveniences so well developed, but the modern station is made as attractive and beautiful as possible from a real artistic point of view, each room being a separate problem with respect to decoration.

This development has been found not in America alone, but in Europe, especially, the station buildings have been regarded as of semi-public importance and attractively placed facing large squares and surrounded by important streets and boulevards. This is true of practically all of the large European stations, and especially the one at Rome with the extensive plaza and wonderful fountain bordered by fine monumental buildings and the ruins of the famous baths of Diocletian. A traveler arriving at such a station must certainly be inspired at the outset and get a very favorable impression of the city he is about to enter. Compare this to



the old American station which was usually located in some out-of-the-way back street and more with reference to freight facilities than access for the passengers. But most of our new stations being built today, show signs of this European influence with respect to placing the building in an imposing position bordering an open square if possible or on the axis of some important street and also bringing the station up into an attractive portion of the town. All of these things are especially true of the new Union Station at Washington, D. C., which may be considered as America's finest railway station.

The question of design is, of course, all-important and one immediately asks what shall be done to make the building express its purpose. This requires a study of the present day part the railway station plays in the life of our big cities. In the olden times all traffic, meaning travelers and wares, entered the city through the huge gates placed at intervals along the city walls and there can be no doubt but that the railway station of today serves the same purpose and has, therefore, so often been spoken of as the "gateway to a city." It is true that it no longer is an opening in a wall out on the outskirts of the town, but nevertheless, it is the portal through which the people and freight are carried in and out. This thought should be the controlling idea in designing the building which should express the appearance of a great gateway. One or more large arched openings seem to express this gateway better than any other motive.



To my notion a close massive classic colonnade for a station facade, as in the case of the Pennsylvania Station in New York City, gives one the impression of a national museum of fine arts and rather obscures the entrance idea, creating an idea of secrecy. From very early dates the arch motive, as shown by the numerous triumphal arches of Europe, has always expressed an entrance, and I think no better motive could be used on this station.

This entrance proposition is probably the foremost question in railway station design, as this type of building always has to deal with crowds and it is very essential that there should be no congestion at the entrances, which means that they must be placed at the proper points and the doors should be wide enough to permit the baggage laden traveler to get in and out without any hesitation or difficulty.

In an article for the *Scientific American* of December 7, 1912, Whitney Warren, one of the architects of the New Grand Central terminal in New York City, has expressed himself along somewhat similar lines, as follows:

"Architecture being a reasoned art, for any specified purpose there should be precedent and tradition, - every motive and element should have its reason for being, and in all compositions, no matter how simple, the elements must explain themselves and justify their presence. In ancient times the entrance to a city was through an opening in the walls or fortifications. This portal was usually decorated and elaborated into an Arch of Triumph, erected to some naval or military victory or to the glory of some great



personage. The city of today has no wall surrounding that may serve, by elaboration, as a pretext to such glorification, but none the less the gateway must exist, and in the case of New York and other cities, it is through a tunnel which discharges its human flow in the very center of the town. Such is the Grand Central Terminal and the motive of its facade is an attempt to offer a tribute to the glory of commerce as exemplified by that institution."



## DESCRIPTION OF SCHEME.

In designing this station I have used the foregoing reasoning and used three large arched openings in the center of the composition, to express the entrance feature and have made the remainder of the building to each side a striking contrast with respect to size of openings in the wall space. In so many instances the front elevation of a station, presents a series of openings of equal size, one for baggage, one for mail and still others for passengers. This seems to me to perplex the traveler at first sight as to just where to enter. In my scheme I have attempted to make the front appear so that there will be no doubt in the traveler's mind as to just where he should enter. The general scheme is to give the building a heavy bold appearance with just an occasional touch of rich ornament as with the clock over the central motive.

As regards the arrangement of the interior I have attempted to bring all the important functions of the station as close together and convenient as possible without causing any congestion. The passenger entering from the street, goes through a vestibule and finds himself in a huge waiting room 150 feet by 60 feet and 70 feet high. Here he may set his baggage down and get his bearing, as from this room opens every portion of the building as he observes. Ahead of him are the ticket stiles through which he passes into the concourse and up to the train level. From the east end of the waiting room opens a long wide lobby where on



one side he can purchase this ticket, step across the lobby and get his Pulman ticket, and then go directly into the baggageroom to check his trunk and parcels. In connection with these ticket offices is also the information desk, it being as near as possible to the people mostly using it. Opposite the baggage room is the men's smoking room and in the rear the barber shop, wash room and toilet rooms.

Starting again in the main waiting room a corresponding lobby opens off to the west where as one approaches one sees to the left the spacious restaurant with its quick service lunch counter, and on the opposite side the women's waiting room with its ante-room and toilet accommodations.

Along both sides of this lobby are found the news stands, fruit and cigar stands, telegraph office and telephone booths, postal station, and cab and baggage transfer agents. Returning again to the central waiting room the traveler can see at each end two marble stairways leading to large vaulted rooms located directly over the two lobbies. One of these is a dining hall where a person may get service equivalent to that in the finest first class hotel. The other room is a retiring room for people who have long waits between train connections and want to get away from the noise and commotion of the main floor. In direct connection with this room is a medical service with an attending physician and nurse. Small ante-rooms are to be fitted up with cots where the injured and sick may be taken to be cared for in the



proper manner between train times. Also in connection with this retiring room are suits of small dressings rooms with laths, etc. These are especially for the suburban man who can come to his work in the morning with his evening clothes in a suitcase and check them. At the end of the day he can return to the station, procure the use of one of these rooms to dress for the evening, meet his wife in the retiring rooms, take dinner in the dining hall across the way, and then leave for the evening social affairs.

The second floor of the building along the front has the general offices of the company and along the track elevation, the offices of the officials directing the train movements.

The third floor contains the offices of the clerical force. Both of these floors have entrance to them by means of stairways and elevators located in the vestibules at each end of the building. This will keep the employees out of the station proper and help lessen any possible congestion at the usual rush hours at morning and night.

In the matter of discharge of passengers from trains it is always the purpose of the company to get these people out on the streets as soon as possible. As the traveler alights from the coach to the platform he may take any one of several flights of steps leading down to the ground level landing in a second concourse. Here, according to the plan, will be provision for taking a cab if desirable, returning to the main waiting room or leaving by foot without reentering the building.



The adjacent building to the west of the station is the suburban station with its own waiting room, ticket offices, toilets, and stair approach to the train level. This entire separation of traffic has been found necessary because the suburban passenger usually arrives only a few moments before train times and does not care to wait in line with a group of through passengers buying complicated tickets or arguing as to the best route to a distant point. The remainder of the first floor of this building is occupied by the United States Mail Department, it being adjacent to their storage space under the tracks. The second and third floors are devoted to offices of the suburban business.

The building to the east of the station is to be occupied by the express company on the first floor as that will be adjacent to their working space and storage room under the tracks. The upper floors are to be occupied by the engineering corps of the railway company.



## CONSTRUCTION AND MATERIALS

Many considerations enter into the selection of a stone for the exterior. The new Grand Central Terminal in New York City has a facade of white marble and this is practical because New York does not permit the burning of soft coal in the business district and the trains are drawn by electric locomotives. But, in the case of Milwaukee, the station is near a big manufacturing district with its hundreds of smoking chimneys, and also the smoke of the locomotives will soon discolor a whitestone. My selection of a light grey Maine granite for the entire exterior is due to the satisfactory weathering qualities this stone has always exhibited as in the case of the new Chicago and Northwestern Terminal in Chicago. To add a touch of color and interest to the facade the marke over entrances are to be of oxidized copper and very rich in detail. This same material is to be used for the window frames and millions in the large arches.

The interior of the main waiting room with its great ribbed barrel-vaulted roof, is to be finished in a delicately colored marble up to the line of the entablature of the cornice treatment. The vault is to be of ornamental tile construction with richly ornamented ribs of terra cotta of a color to harmonize with the marble below.

This room is to be fitted with large handsome benches of mahogany, surmounted by lamp standards of artistic design placed at both ends of each bench for the benefit of those who desire to read while waiting for their train.



The general illumination in the room will be by the indirect method, the lights being concealed behind the cornice.

The smaller waiting rooms and also the dining and retiring rooms on the second floor are to be vainscoted with Verde Antique markee to the height of the window stools. Above this the wall space is to be divided into panels by staff Ionic columns and the spaces between prepared for mural decorations. The walls of the concourse are to be lined with a delicately tinted dull-finished tile, all columns and mouldings being of dull finished terra cotta. The ceiling of the concourse will be of arched tile construction to harmonize with the walls.

Above, on the track level, will be the train sheds of which is known as the Bush type. These are low sheds just permitting the trains to pass through and with open slots above the center of each track to carry away the smoke and gases from the locomotives. The big arched train shed spanning the entire track area is now a thing of the past as the gases of locomotive smoke quickly deteriorate the steel work, and also the noise and echo of the puffing locomotives is very disagreeable.

In this discussion of "Materials and Construction" I have not intended to give a detailed account of all the materials used in building and decorating this building nor write a set of specifications for its erection, but I wanted merely to give an idea of the general impression a person would receive in a general survey of the building.



## BIBLIOGRAPHY.

In the preparation of this thesis I have used ideas obtained from personal investigations of several important European stations and the larger stations in New York City and Chicago. In addition to this I have largely gotten my data from the following list of books in the General Library and Architectural Library of the University of Illinois:

American Architect. Volumes 100; 94; 95; 89; 97; 96; 93.

Architectural Record. Volumes 24; 18.

Brick Builder. Volume 9.

Architectural Annual 1900.

American Competitions 1907.

Handbuch der Architecture. Volume 14.

Buildings and Structures of American Railroads.

Reynaud. Volume 2.

Gaudet. Volume 2.

Technical World. Volume 17.

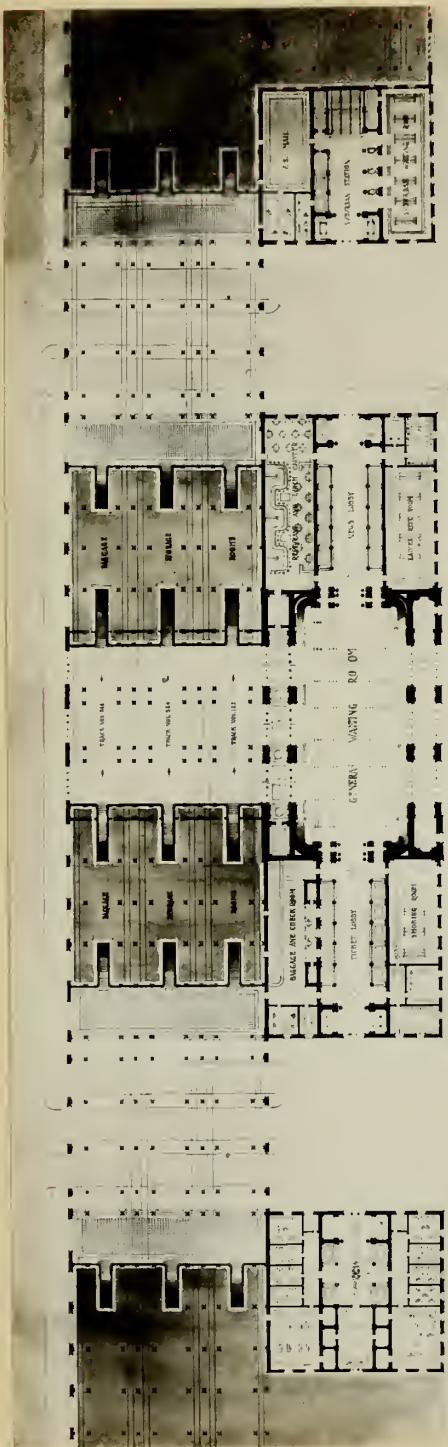
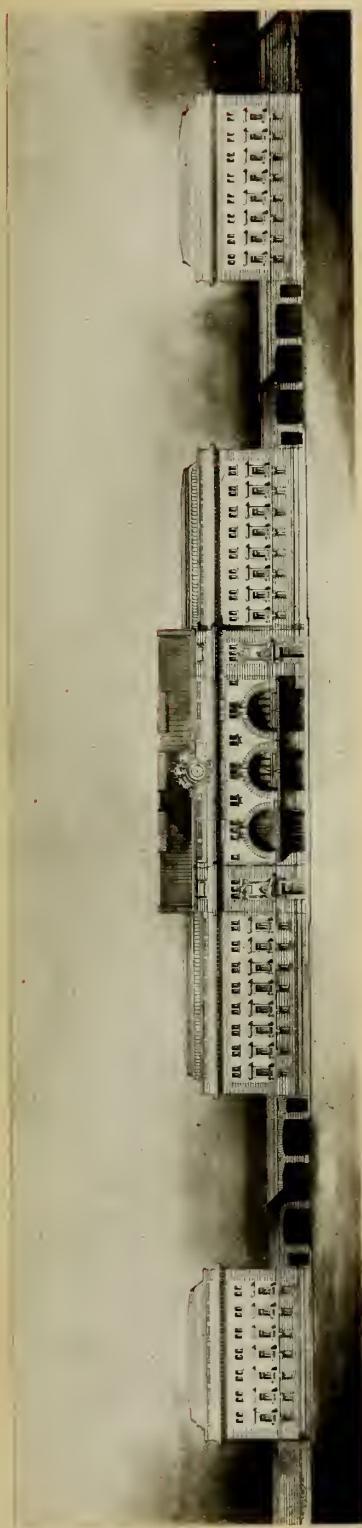
Independent. Volume 72.

Scientific American. Volumes 74; 104; 105; 93; 99; 92; 94.

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Harper's Weekly. Volume 57.









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